

IN THE CLAIMS:

1 1. (Currently amended) A network device, comprising:

2 bridging logic operative, when enabled, to function as a data link layer bridge
3 by (i) receiving data link layer messages from first and second communications links
4 coupled to the network device, the first and second communications links forming
5 part of a single network-layer network segment, and (ii) forwarding the messages
6 received from either one of the communications links to the other communications
7 link;

8 routing logic operative, when enabled, to function as a network layer router by
9 (i) receiving network layer messages from the first and second communications links,
10 the first and second network links forming respective different network-layer
11 network segments, and (ii) selectively forwarding the network layer messages
12 received from either one of the communications links to the other communications
13 link based on a routing algorithm and respective network layer network addresses in
14 the received network layer messages; and

15 selection logic operative during operation of the network device to (i) enable
16 the bridging logic and disable the routing logic under a first set of operating
17 conditions, wherein a transition from router operation to bridge operation includes
18 merging multiple network-layer segments into a bridged network-layer segment, and
19 (ii) enable the routing logic and disable the bridging logic under a second set of
20 operating conditions, wherein a transition from bridge operation to router operation
21 includes dividing a bridged network-layer segment into multiple segments having
22 distinct routing identities.

1 2. (Currently Amended) A network device ~~according to claim 1~~ comprising:

2 bridging logic operative, when enabled, to function as a data link layer bridge
3 by (i) receiving data link layer messages from first and second communications links
4 coupled to the network device, the first and second communications links forming

5 part of a single network-layer network segment, and (ii) forwarding the messages
6 received from either one of the communications links to the other communications
7 link;

8 routing logic operative, when enabled, to function as a network layer router by
9 (i) receiving network layer messages from the first and second communications links,
10 the first and second network links forming respective different network-layer
11 network segments, and (ii) selectively forwarding the network layer messages
12 received from either one of the communications links to the other communications
13 link based on a routing algorithm and respective network layer network addresses in
14 the received network layer messages; and

15 selection logic operative during operation of the network device to (i) enable
16 the bridging logic and disable the routing logic under a first set of operating
17 conditions, and (ii) enable the routing logic and disable the bridging logic under a
18 second set of operating conditions,

19 wherein the first set of operating conditions includes the condition that less
20 than a predetermined number of link numbers are available for use as part of a
21 network-layer address prefix for one of the communications links.

1 3. (Currently Amended) A network device according to claim 2-4, wherein the second
2 set of operating conditions includes the condition that the number of nodes residing
3 on the first and second communications links collectively exceeds a predetermined
4 threshold number.

1 4. (Original) A network device according to claim 3, wherein the selection logic is
2 operative to track the number of nodes on the first and second communications links,
3 and to autonomously decide to enable the routing logic and disable the bridging
4 logic.

1 5. (Currently Amended) A network device according to claim 2-4, wherein the
2 selection logic is operative to autonomously determine whether the first set of
3 operating conditions are met.

1 6. (Currently Amended) A network device according to claim 2-4, wherein the
2 selection logic is operative to cooperate with another network device in a common
3 network region in determining whether the first set of operating conditions are met.

1 7. (Currently Amended) A network device according to claim 2-4, wherein the
2 determination of whether the first set of operating conditions are met is made by a
3 separate network device in a common network region, and wherein the selection logic
4 is operative to enable the bridging logic and disable the routing logic in response to a
5 control message received from the separate network device.

1 8. (Currently Amended) A network device according to claim 2-4, wherein (i) the
2 first and second communications links are part of a group of three or more
3 communications links coupled to the network device with respect to which bridging
4 and routing functionality can be selected, (ii) the selection logic is further operative
5 in accordance with a predetermined selection algorithm to select the communications
6 links in the group that are to have their respective routing and bridging functions
7 enabled and disabled.

1 9. (Original) A network device according to claim 8, wherein the predetermined
2 algorithm for selecting communications links under the first set of operating
3 conditions includes selecting a pair of communications links collectively having
4 fewer attached nodes than any other pair of communications links in the group.

1 10. (Original) A network device according to claim 8, wherein the predetermined
2 algorithm for selecting communications links under the second set of operating
3 conditions includes selecting the communications links included in the network

4 segment having more attached nodes than any other network segment defined by
5 communications links in the group.

1 11. (Currently Amended) A method of operating a network device, comprising:

2 performing the function, when enabled, of a data link layer bridge by (i)
3 receiving data link layer messages from first and second communications links
4 coupled to the network device, the first and second communications links forming
5 part of a single network-layer network segment, and (ii) forwarding the messages
6 received from either one of the communications links to the other communications
7 link;

8 performing the function, when enabled, of a network layer router by (i)
9 receiving network layer messages from the first and second communications links,
10 the first and second network links forming respective different network-layer
11 network segments, and (ii) selectively forwarding the network layer messages
12 received from either one of the communications links to the other communications
13 link based on a routing algorithm and respective network layer network addresses in
14 the received network layer messages; and

15 operation of the network device, (i) enabling the bridge function and disabling
16 the router function under a first set of operating conditions, and (ii) enabling the
17 router function and disabling the bridge function under a second set of operating
18 conditions,

19 wherein the first set of operating conditions includes the condition that less
20 than a predetermined number of link numbers are available for use as part of a
21 network-layer address prefix for one of the communications links.

1 12. (Currently Amended) A computer program product including a computer readable
2 medium, the computer readable medium having a network router/bridge program
3 stored thereon for execution in a computer functioning as a network node, the
4 network router/bridge program comprising:

5 program code operative, when enabled, to function as a data link layer bridge
6 by (i) receiving data link layer messages from first and second communications links
7 coupled to the network node, the first and second communications links forming part
8 of a single network-layer network segment, and (ii) forwarding the messages received
9 from either one of the communications links to the other communications link;

10 program code operative, when enabled, to function as a network layer router
11 by (i) receiving network layer messages from the first and second communications
12 links, the first and second network links forming respective different network-layer
13 network segments, and (ii) selectively forwarding the network layer messages
14 received from either one of the communications links to the other communications
15 link based on a routing algorithm and respective network layer network addresses in
16 the received network layer messages; and

17 program code operative during operation of the network node to (i) enable the
18 bridge program code and disable the router program code under a first set of
19 operating conditions, and (ii) enable the router program code and disable the bridge
20 program code under a second set of operating conditions,

21 wherein the first set of operating conditions includes the condition that less
22 than a predetermined number of link numbers are available for use as part of a
23 network-layer address prefix for one of the communications links.

1 13. (Currently Amended) A computer data signal including a network router/bridge
2 program for execution in a computer functioning as a network node, the network
3 router/bridge program comprising:

4 program code operative, when enabled, to function as a data link layer bridge by (i)
5 receiving data link layer messages from first and second communications links coupled to
6 the network node, the first and second communications links forming part of a single
7 network-layer network segment, and (ii) forwarding the messages received from either one
8 of the communications links to the other communications link;

9 program code operative, when enabled, to function as a network layer router by (i)
10 receiving network layer messages from the first and second communications links, the first
11 and second network links forming respective different network-layer network segments, and
12 (ii) selectively forwarding the network layer messages received from either one of the
13 communications links to the other communications link based on a routing algorithm and
14 respective network layer network addresses in the received network layer messages; and
15 program code operative during operation of the network node to (i) enable the bridge
16 program code and disable the router program code under a first set of operating conditions,
17 and (ii) enable the router program code and disable the bridge program code under a second
18 set of operating conditions,
19 wherein the first set of operating conditions includes the condition that less
20 than a predetermined number of link numbers are available for use as part of a
21 network-layer address prefix for one of the communications links.

1 14. (Currently Amended) A network device, comprising:

2 means for functioning, when enabled, as a data link layer bridge by (i) receiving data
3 link layer messages from first and second communications links coupled to the network
4 device, the first and second communications links forming part of a single network-layer
5 network segment, and (ii) forwarding the messages received from either one of the
6 communications links to the other communications link;

7 means for functioning, when enabled, as a network layer router by (i) receiving
8 network layer messages from the first and second communications links, the first and second
9 network links forming respective different network-layer network segments, and (ii)
10 selectively forwarding the network layer messages received from either one of the
11 communications links to the other communications link based on a routing algorithm and
12 respective network layer network addresses in the received network layer messages; and

13 means operative during operation of the network device for (i) enabling the bridge
14 function and disabling the router function under a first set of operating conditions, and (ii)

15 enabling the router function and disabling the bridge function under a second set of
16 operating conditions,
17 wherein the first set of operating conditions includes the condition that less
18 than a predetermined number of link numbers are available for use as part of a
19 network-layer address prefix for one of the communications links.